

# Navy Purchase Description Marine Gas Oil Fuel Concerns

- DESC Quality Day Briefing -

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# MGO Overview

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- Navy Distillate Fuel (MILSPEC F-76) no longer readily available to CG
  - Very strict spec, testing & handling requirements
  - Lots of positive Navy & CG experience using F-76
  - Compatible with both diesels and gas turbines
- Navy Purchase Description MGO commercially available alternative fuel
  - Procured under DESC contract
  - Fewer and less restrictive requirements than F-76

# Coast Guard Fuel Policy

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- NPD MGO considered an alternate fuel on diesel powered cutters
  - Must be used within 6 weeks due to lack of storage stability requirements
    - Serious operational constraint, not really practical
  - Consistent with Navy NPD MGO policy
- Not used on gas turbine powered cutters
  - Technical concerns with CG's FT4 gas turbines
  - Treated as an emergency fuel
    - Only minimum amounts lifted if nothing else available

# CG Realities

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- CG using high percentages of NPD MGO fuel
  - Due to distributed CG basing must rely on commercial suppliers
  - Our only source of F-76 is Navy bases and oilers
- CG crews avoid lifting NPD MGO
  - Primary concern is storage stability
  - Destabilized fuel linked to several engine casualties
- Coordinated effort between CG ELC, DESC, and NSWC/CD, & NRL
  - Define impact of burning NPD MGO and mitigate any possible consequences

# F-76 Vs. NPD MGO

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- Most parameters nearly identical
- No requirements in MGO for:
  - storage stability
  - maximum particulates (mg/l)
  - demulsification time
  - trace metals
- Less restrictive requirements in NPD MGO for:
  - acidity
  - carbon residue
  - ash content

# Priorities

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- Storage stability
  - Must expand current 6 week storage limit
- Resolve FT4 GT concerns
  - Current ban results in serious operational restrictions for High Endurance Cutters
- Define operational/maintenance actions required to mitigate MGO concerns
  - Expanded to look at all CG fuel handling policies
  - Will define both physical SHIPALTs and operational/husbandry policy changes
  - Based on best information available to date

# Storage Stability

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- No storage stability testing requirements in NPD
  - High change out rates for engine filters
  - Centrifugal purifiers ineffective
  - Disarms coalescers
  - Expensive to pump off and dispose of
- Biological contamination also a major issue
  - Most CG “destabilized” fuel problems appear to be microbiological in nature
- Need standardized procedures for bad fuel

# FT4 Gas Turbine Concerns

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- Hot Section Corrosion
  - No limits on trace metals
    - Trace metals should not be present in a 100% distillate fuel
    - As delivered condition what is important
  - Higher Carbon Residue & Ash levels
- Burner Can issues due to higher Carbon Residue & higher viscosity
  - Burner can streaking/distress
  - Nozzle clogging & coking
  - FT4 design more susceptible than LM2500



# The Plan

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- Plug into existing fuel expertise
  - Defense Energy Supply Center (DESC)
  - Naval Surface Warfare Center/Carderock Division (NSWC/CD)
  - Naval Research Laboratory (NRL)
- Benefit from their past work & experience
  - Avoid previously visited non-productive paths
- Cooperate in any ongoing efforts
- Leverage CG work to greatest extent possible

# Fuel Sampling

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- Participating in DESC sampling program
- Build database of fuel characteristics
  - as received by CG vessels
  - non F-76 & non JP-5 fuel samples
- 15 cutters participating in pilot program
  - geographically distributed along both coasts
  - includes ships that routinely lift fuel outside CONUS
- Want to define how bad (or good) situation really is

# Fuel Analysis

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- Special DESC sampling/analysis contract
  - Mod to existing Navy DNV sampling contract
  - Testing to NPD requirements plus:
    - Chemical storage stability
    - Particulates
    - Acidity
    - Trace metal content
  - Hope to define a more realistic time limit for usage (>> 6 weeks) and typical trace metal/ash content to address FT4 corrosion concerns

# FT4 Issues

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- FT4 material laboratory burner rig testing
  - Investigate Hot Section Corrosion Concerns
    - Initially examines only impact of higher Carbon Residue levels
    - Follow-up testing for “typical” trace metal content
- Planned shipboard test
  - Address both hot section and burner can concerns
  - Baseline & periodic engine inspections
  - “Controlled” test with 1 year duration
    - No special test fuel & no special mission profile
    - Instrument all critical parameters
    - Sample & analyze fuel

# Update CG Fuel Policy

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- Conduct review of CG fuel system characteristics/capabilities
  - Establish baseline for where we are
  - Identify where procedural or physical changes must be made
- Standardized procedures for problem fuel
  - Define testing to determine cause
  - Recovery/prevention actions
- Not limited to only NPD MGO
  - Includes review of biocide additive use

# Planned FY 99 Efforts

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- Kickoff & expand fuel sampling/analysis program
- Identification of SHIPALTS/management practices required to mitigate use of MGO
- Completion of FT4 laboratory corrosion tests
- Initiate WHEC 378 shipboard MGO evaluation
- Continued support from Navy fuel expert community
  - Expand to include biological contamination expertise

# Funding Problems

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- Funding problems may limit FY99 progress
  - Currently approved funding will limit efforts to updating CG fuel policy
  - Shipboard fuel sampling/analysis potentially limited to FY 98 funding
    - less than full year's data
- Attempting to increase funding
  - Hope to at least complete lab FT4 burner rig testing & add funding to shipboard analysis effort
  - Would also like to complete detailed test plan for shipboard FT4 testing

# Summary

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- MGO fuel issue a complex problem
  - No magic bullets
- Making progress
  - Still got a way to go before all concerns are adequately addressed
  - Follow-on effort required into FY 00
  - Funding shortfall is a major hindrance